for quartiles 1 vs 4), and by WOMAC index (-17.9, -15.7, -13.1, -5.6, p=0.03 for 1 vs 4), despite similar baseline pain scores for each quartile. The multi-week formulations (n=27) of HA provided more relief than the single-injection products (n=11), with improvements of +15.7 vs +9.9, p=0.26 by KOOS pain and -15.4 vs -7.6, p=0.11 by WOMAC index. The use of ultrasound guidance associated strongly with better relief, by KOOS pain (+19.0 vs +9.1, p=0.05) and the WOMAC index (-19 vs -7.3, p= 0.01) Gender, anatomic injection technique (medial, lateral, anterior flexed) and prior HA injections had no effect on symptoms.

Conclusions: In our preliminary data thus far, patients reporting more relief 2 months after HA injection were younger and had lower BMIs and less severe radiographic arthritis, while the use of ultrasound guidance and selection of drug administered over multiple weeks also associated with improved outcomes. These data, with further enrollment and longer followup, could help tailor future algorithms for more appropriate, successful, and cost-effective use of HA viscosupplementation in the non-operative management of KOA.

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KNEE JOINT DISTRACTION COMPARED WITH HIGH TIBIAL OSTEOTOMY: A RANDOMIZED CONTROLLED TRIAL.

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Purpose: Knee joint distraction (KJD) results in clinical improvement and cartilage repair in young, active patients with knee OA. Another knee preserving treatment, in medial compartment knee osteoarthritis, is a high tibial osteotomy (HTO), which has good mid-term and longer follow-up results. However, no comparative data on efficacy is available. A RCT was set out and determined whether there was a clinical relevant difference in functional outcome after 1-year between KJD and HTO.

Methods: 69 patients with medial osteoarthritis were included and randomized to KJD (23 patients) or HTO (46 patients). A WOMAC questionnaire (100 being the best) was assessed at baseline (BL) and 12 months. EQ-5D index score was used to assess improvement in the quality of life (1 being the best). Joint space width (JSW) of the medial compartment was determined on standardized semi-flexed x-rays at BL and 1-year. For the tables: A asterisk indicates P < 0.05 relative to the preoperative baseline score, a hashtag indicates P< 0.05 relative to the other treatment group (KJD).

Results: Of the 69 patients enrolled in the randomized controlled trial, 23 were assigned to KJD and 46 to HTO. After randomization one patient who was assigned KJD and one patient who was assigned HTO were excluded. Of the remaining 67 patients the baseline characteristics of the affected knee is given in table 1. Total WOMAC scores demonstrated significant clinical improvement in both groups. The KJD group increased from 57±17 points at BL to 76±17 points at 1-year (p<0.001). Similarly, the HTO group had a score of 52±16 points at BL, which increased to 81±16 points (p<0.001). Parallel results were seen for the VAS and the quality of life (table 2). None of the parameters showed a statistical significant difference between the two groups at 1-year (p=0.318, p=0.170 and p=0.787 resp.). Both the minimum and mean JSW showed a steeper increase in the KJD-group (table 2).

Conclusions: Six weeks of KJD does not lead to a clinical relevant difference in outcome compared with HTO after 1-year. Importantly both KJD and HTO lead to substantial newly formed cartilage-like tissue with superiority of KJD. Thus KJD is an alternative option in patients less suitable for HTO.

Table 1
Baseline characteristics HTO versus KJD

Characteristics Mean (± SEM)	HTO (n = 45)	KJD(n = 22)
Male gender (n)	27/45 (60%)	16/22 (73%)
Height (cm)	177 ± 2	178 ± 2
Weight (kg)	85.2 ± 2.1	87.2 ± 2.8
Body mass index (kg/m2)	27.2 ± 0.5	27.5 ± 0.7
Affected knee (left)	20/45 (44%)	10/22 (45%)
Most affected compartment (medial)	45/45	22/22
Age at surgery (yr)	49.4 ± 1.0	51.2 ± 1.1
Kellgren & Lawrence grade	2.5 ± 0.1	2.3 ± 0.2
Grade 0 (n)	1	0
Grade 1 (n)	5	6
Grade 2 (n)	12	4
Grade 3 (n)	23	11
Grade 4 (n)	4	1
Tibiofemoral axis (°)	6.2 ± 0.3	5.8 ± 0.6

Table 2
pre- and postoperative follow-up data for both treatments

Score		HTO BL	HTO 3m	HTO 6m	HTO 12m	HTO BL ->1y	KJD BL	KJD 3m	KJD 6m	KJD 12m	KJD BL ->1y
WOMAC	Pain	49±18	68±17*	76±19*	81±18*	32±18#	55±17	69±23*	76±20*	76±15*	21±19
	Stiffness	47±20	58±21*	64±23*	69±19*	22±21#	52±20	56±21	58±19	60±18	8±25
	Function	54±17	68±14*	76±18*	82±17*	28±18	58±19	65±22	75±19*	78±19*	21±17
	Total	52±16	67±14*	75±17*	81±16*	28±17	57±18	65±20	74±18*	76±17*	20±16
VAS (0-100)	Pain	65±18	47±26*	37±24*	27±23*	-38±24#	54±23	46±29	34±23*	36±26*	-18±26
EQ-5D (0-1)	Index score	0.64±0.2	0.68±0.2#	0.68±0.3	0.79±0.3*	0.15±0.3	0.63±0.2	0.52±0.3	0.69±0.2	0.77±0.1*	0.14±0.3
X-ray	Mean	1.96±1			2.44±1*	0.48±1	2.01±1			2.78±1*	0.77±1
(JSW)	Min	0.60±1			0.96±1*	0.37±1	0.51±1			1.33±1*	0.82±1

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PREOPERATIVE DETERMINANTS OF EARLY AND MEDIUM TERM PATIENT-REPORTED PAIN AND DISABILITY FOLLOWING TOTAL KNEE ARTHROPLASTY: A SYSTEMATIC REVIEW

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Purpose: Total knee arthroplasty (TKA) is a common procedure intended at treating patients with advanced knee osteoarthritis (OA). Although TKA is generally a successful intervention, leading to a dramatic amelioration in pain levels as well as functioning status, it yields unsatisfactory results in up to one third of patients. A sound knowledge of the determinants of TKA outcomes can help in patient selection, preparation and education, especially regarding possible risks and benefits of the procedure. Currently, the published systematic reviews summarizing the evidence of preoperative determinants base their findings on studies with low methodological quality and focus on particular types of determinants. Therefore, no consensus exists regarding either the identity or the strength of the association of TKA determinants with poor outcomes. The purpose of this systematic review was therefore to assess the current status of the literature evaluating preoperative determinants of early and medium term patient-reported pain and disability.

Methods: A search in four databases (Medline, Pubmed, Embase and CINAHL) from their respective inception dates until October 2014 was undertaken using a combination of keywords and MESH terms. Two authors independently reviewed the titles, abstracts and full texts of the articles in order to evaluate their eligibility. Selection criteria included: 1- participants undergoing primary unilateral TKA with a follow-up up to 2 years, 2- validated disease-specific patient-reported outcome measures assessing pain and/or function used as outcome measure and 3- identification of preoperative determinants obtained via multivariate analyses. The risk of bias and the methodological quality of the included

studies was assessed using a modified version of a methodology checklist for prognostic studies.
Results: Thirty-four prognostic studies were included. Mean total score for the methodological quality was 80.1±12.9 %. No study received lower than 58.3% and four were graded 100%. These results indicate a moderate-to-high methodological quality of the included studies. Among demographic determinants of poor TKA outcomes female gender was significant in four out the 18 studies where it was investigated. Greater socioeconomic deprivation is the sole socioeconomic determinant presenting conclusive evidence in both studies where it was assessed. Psychosocial determinants included the presence or a greater level of depression and/or anxiety (seven out of 11 studies) as well as greater pre-operative pain catastrophizing (all four studies). Clinical determinants with significant importance included worse pre-operative pain or function levels (21 studies with significant results out of 23), presence or greater levels of comorbidity (12 our of 23) higher body mass index (BMI) (four out of 12), back pain (five out of six) and lower general health (11 out of 11). No conclusions can be reached regarding the strength of the associations between significant determinants and TKA results because of heterogeneity of study methodologies and results.
Conclusions: Moderate-to-high methodological quality of included studies suggests that pre-operative determinants of short to medium-term pain and function outcomes following TKA include female gender, greater social deprivation, the presence or a greater level of depression and/or anxiety, greater pre-operative pain catastrophizing, worse pre-operative pain or function levels, presence or greater levels of comorbidity, higher body mass index (BMI), presence of back pain and lower general health. Because of inconsistent findings in the case of several variables, further high-quality research has to be undertaken in order to elucidate with greater precision the identity of determinants and strength of the association with pain and disability following TKA in order to provide the best possible care for patients with severe knee OA.

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A SYSTEMATIC REVIEW OF THE PREOPERATIVE DETERMINANTS OF PATIENT-REPORTED PAIN AND DISABILITY UP TO TWO YEARS FOLLOWING TOTAL HIP ARTHROPLASTY

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Purpose: Recent recommendations suggest that total hip arthroplasty (THA) is indicated when the patients' functional limitations and pain levels due to hip osteoarthritis (OA) are refractory to pharmacological and non-pharmacological treatments. THA is generally an effective intervention as the great majority of patients report an improved functional status and a lesser degree of pain. Although generally successful, THA can yield limited results in terms of pain and functional outcomes in up to one fourth of the cases. Consequently, a thorough understanding of the determinants of patient-reported pain and function can help plan required interventions directed at improving the outcomes. Such interventions include patient selection and education, targeting of modifiable risk factors as well as appropriate rehabilitation. The evidence on the determinants of THA outcomes in terms of pain and function provided by the published systematic reviews is unconvincing, as most of the conclusions often focus only on one class of determinants and draw their findings from studies with high risk of bias. Therefore, the purpose of the current systematic review was to identify preoperative determinants of patient-reported pain and disability up to two years following THA in studies with appropriate methodological quality.
Methods: Four databases (Medline, Pubmed, Embase and CINAHL) were screened from their respective inception date until October 2014 using a combination of keywords and MESH terms in order to identify pertinent titles. Two authors assessed eligibility of the entries by independently reviewing the titles, abstracts and full texts of the articles. Criteria for inclusion were 1- participants with primary unilateral THA with a follow-up up to 2 years, 2- validated disease-specific patient-reported outcome measures assessing pain and/or disability and 3- identification of determinants obtained via multivariate analyses. The methodological quality of the included studies was assessed using a modified version of a methodology checklist for prognostic studies.
Results: Nineteen manuscripts were included. The mean score of the methodological quality was 79.6±10.0 %. No study received a score lower than 66.7% and three studies were graded above 90%. These results indicate a moderate-to-high methodological quality. Among demographic determinants of THA results, in three out the nine studies evaluating the association between age and THA outcomes, being older was significantly related to poor surgical results. Among the socioeconomic determinants, a lower educational level was significantly related to worse pain and function (all three studies). Clinical determinants related to poor outcomes included worse preoperative levels of pain and physical function (six out of ten studies), higher body mass index (BMI) (five out of eight), presence or a greater level of comorbid medical conditions (all four studies) and worse general health (all three studies). The different approaches at evaluating determinants as well as the large spectrum of findings limited the assessment of the strength of associations of the variables with THA outcomes.
Conclusions: Moderate-to-high quality of evidence suggests that variables associated with patient-reported pain and disability following THA include older age at the time of surgery, a lower educational level, worse preoperative levels of pain and function, higher BMI, presence or a greater level of comorbidities and worse general health. Because of several conflicting findings regarding the direction and the significance of the associations of certain variables with THA outcomes, more research is warranted in order to clarify the identity of determinants and their strength of association with greater certainty.

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THE ASSOCIATION OF WHOLE BODY PAIN DIAGRAM SCORES WITH OA-RELATED PAIN, FUNCTION, PAIN CATASTROPHIZING, AND MENTAL HEALTH IN PATIENTS WITH KNEE OSTEOARTHRITIS

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Purpose: Given that about 20% of total knee replacement recipients reach suboptimal outcomes, pre-operative factors that could flag patients at high risk for the suboptimal response to TKR are an area of active investigation. Pain catastrophizing, greater medical comorbidity, lower educational attainment, depression, fear avoidance, and psychological factors are associated with persistent pain and functional limitation following TKR. Routine measurements of these variables can be burdensome in an outpatient clinical practice. We hypothesized that a greater number of painful anatomic areas, as self-reported on a whole-body pain diagram, is associated with worse scores on measures of pain, functional status, pain catastrophizing, anxiety and depression, along with greater resource utilization.
Methods: Patients (n=269) with knee osteoarthritis undergoing elective TKR at one academic center and two community orthopedic centers were enrolled prior to surgery in a prospective cohort study between September 2012 and April 2014. Questionnaires included the WOMAC Pain and Function Scales, Pain Catastrophizing Scale, Mental Health Inventory-5 and a 19-point pain body diagram. The diagram documents pain in 18 anatomic areas including the index joint. he number of painful areas on the pain diagram was categorized as "high" ($\geq$5 areas), "medium" (3-4), and "low" (0-2) after evaluation of the distribution of pain diagram scores. We utilized generalized linear regression models to evaluate the association between pain diagram categories and measures of OA-related pain and function, mental health and pain catastrophizing, adjusting for age and sex.
Results: The range in pain diagram scores was 0-17. At all three clinical sites, pain diagram score categories were equally distributed among patients. The distribution of age, body mass index, level of educational attainment, and current use of pain medications were similarly distributed across participants' pain diagram categories. Women comprised 71% of the high pain diagram score group as compared with 58% of the lowest pain diagram score category. We found a significant trend in use of more medications among individuals with higher pain diagram scores ($p=0.005$). Similarly, patients in higher pain diagram categories sought services from a number of health care professionals more frequently ($p<0.001$). Adjusting for age and sex, greater pain diagram scores were significantly ($p<0.002$ for all) associated with higher OA-related pain and function, pain catastrophizing, and worse mental health (Table).
Conclusions: A greater number of painful areas, as documented preoperatively on a whole body pain diagram, was strongly associated with several risk factors for poor TKR outcome including greater levels of pain catastrophizing, and worse mental health. The pain diagram score was also associated with more frequent use of medical resources prior to surgery as patients with more widespread pain had more frequent visits to healthcare professionals. Using the pain diagram may offer a